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Inter-Life: a novel, three-dimensional, virtual learning environment for life transition skills learning

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This paper presents the findings from one of the first empirical research studies which has investigated the impact of Inter-Life; a novel three-dimensional immersive virtual learning environment, on learning and development of social and educational life transition skills in a group of looked after and accommodated children. Drawing on social constructivism in which meaningful learning is related to context and situated in practice, we report on a series of Inter-Life workshops that enabled young people to work together and *through the processes of participation in authentic learning activities* contributed to the development of life transition skills such as self-confidence, empathy, negotiation and mediation skills, teamwork and active problem-solving skills. The novel affordances of the Inter-Life virtual world which contributed to the development of the learning community included the ability to personalise learner engagement and activities from the outset along with 'co-presence' and 'immersion' and the flexibility provided by the innovative, technology-enhanced Inter-Life platform. This study presents some empirical evidence to demonstrate the efficacy of new models of learning that are mediated by innovative malleable technologies that can be shaped by the learner in a participatory manner.

Keywords: Inter-Life; transition skills learning; 3-dimensional virtual learning environment; social constructivism

Introduction

The present study details a novel approach to life transition skills learning using Inter-Life, which is a novel technology enhanced, three-dimensional, immersive virtual learning environment. The Inter-Life research project is an interdisciplinary project funded by the EPSRC/ESRC Teaching and Learning Research Programme technology-enhanced learning (TEL) phase (http://www.tlrp.org/tel/) in the UK (Lally et al., 2009). Inter-Life is an immersive three-dimensional virtual world based on the Linden Lab *Second Life*™ platform but has been extensively modified and includes novel integrated automated data collection tools and private spaces for critical reflection (Magill et al., 2009). Since the potential of virtual worlds for learning is now being investigated (Bronack, Riedl, & Tashner, 2006; Dalgarno & Lee, 2010; Dede, 2009), there is a need to address such

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novel technologies and their role in learning from a critical educational perspective and in situated, authentic learning contexts (Laurillard, 2002; Selwyn, 2010).

Transition is no longer considered a linear process and young people require skills for dealing with change, risk, uncertainty and complexity throughout the life-course (Ahier & Moore, 1999). There is also current discourse in the literature about the paradigmatic shift in education and learning from a traditional instructional model to a more personalised, learner-centred model in which life transition skills (such as self-confidence, empathy, problem-solving, leadership, negotiation and teamwork) are a prerequisite for the successful navigation of social and educational transitions in the 'knowledge age' against a framework of lifelong learning (Facer & Sandford, 2010; Robertson, 2005).

Life transitions are challenging for most young people, but those on the margins of society, such as young people experiencing poverty or who are in the care of government local authorities, may be particularly vulnerable. Previous studies have reported on the inherent difficulties in reaching and working with looked after and accommodated children (Heptinstall, 2000). Some previous studies have used methodologies in order to capture 'the voice of the child' to improve ownership of issues related to young people in care, but it is debatable if any of these have actively involved the young people in a participatory fashion (Holland, 2009). Several studies show the persistence of the gap in attainment, life chances and positive destinations in this group of young people (Connelly & Chakrabarti, 2008; Jackson & McParlin, 2006). This highlights the importance of being inclusive of all young learners and to understand the transition challenges, *as experienced and communicated by the learners*, in order to enable them to learn the necessary skills to improve their navigation of challenging social and educational transitions. Enhanced technologies for learning represent a novel tool to support student centred, collaborative learning that may resonate with their 'digital' culture more readily than traditional approaches (Kennedy, Judd, Dalgarno, & Waycott, 2010).

Inter-Life is an interdisciplinary research project that aims to provide a safe online space for young people to work together on learning activities as processes that contribute to the development of life transition skills. Participation in the Inter-Life activities was part of the *learning process as well as the outcomes*, since through participation in activities and creation of resources for peers, transition skills learning and development was operationalised and could be mapped to learning outcomes.

Aim and research questions

The research aim of the present study was to investigate how young people *experienced* the context of Inter-Life as a safe space to address their real-life transition challenges and whether this changed *as a result of participation over time*. In particular, we wished to investigate the following research questions:

(1) Do the new affordances offered by Inter-Life, such as the ability to personally customise avatar design and/or the ability to personalise learning activities have any impact on learner engagement?
(2) What is the overall efficacy of the Inter-Life virtual world as a technology-enhanced tool in contributing to life transition skills learning such as self-confidence, empathy, negotiation and mediation skills, teamwork, leadership and active problem-solving skills?

Background

The role of three-dimensional immersive virtual environments in education and learning is receiving increasing attention (Bronack et al., 2006; Dalgarno & Lee, 2010; De Freitas, Rebolledo-Mendez, Liarokopis, Magoulas, & Poulovassilis, 2010; Dickey, 2011) and previous studies have assessed the potential of virtual worlds such as *Active Worlds* and *Second Life*™ for various learning activities (Dede, 2009; Dickey, 2005). These studies have mainly been descriptive accounts of heavily structured activities or simulations designed towards specific, pre-determined, learning outcomes with some studies reproducing a 'real world' lecture hall or campus in the virtual environment (Hew & Cheung, 2010; Jin, Wen, & Gough, 2010). However, it is important to ensure that such new 'spaces' or 'tools' for learning with their novel affordances are considered within robust educational theory to guide meaningful learning experiences for those who will engage with them (Hunsinger & Krotoski, 2010; Selwyn, 2010).

Previous studies have started to address the need for evaluation methodologies that are suitable for investigating learning in virtual worlds. De Freitas and Oliver (2006), building on the conceptual knowledge and understanding of online immersive games and learning, have reported an inductive methodology augmented by the 'four dimensional framework' for evaluation (De Freitas et al., 2010). Childs (2010) has reported on a conceptual evaluation framework for mediated immersive environments and also defines the novel affordances that the virtual world provides including 'co-presence', 'immersion' and 'embodiment' (in the form of an 'avatar' or virtual persona) which are additional, new social and cultural affordances that were not available in earlier online 'virtual learning environments' such as Sakai or Moodle (Childs, 2010; Minocha & Roberts, 2008; Minocha, Tran, & Reeves, 2010). These novel features and multi-modal communication affordances and their impact on learning have still to be fully researched in authentic settings (Dede, 2009). For example, the embodiment in the form of an avatar, with real time virtual rendering of an environment shared in an interactive fashion with peers, is a novel and potentially powerful new social and socio-cultural affordance for learning. Childs (2010) also proposed the 'mediated environments reference model', in which he draws on aspects of both Activity Theory (Engeström, 1999) and the Community of Practice model (Jonassen, 1999; Wenger, 1998). Bronack et al. (2006) have reported on the alignment of the theoretical concepts within social constructivism and virtual world affordances for student-centred learning. Dalgarno and Lee (2010) have reported on immersion and co-presence and how these affordances of virtual worlds contribute to the formation of community. However, in most studies conducted to date, virtual immersive environments have been largely investigated in the higher education (HE) setting in association with certified undergraduate courses or with beginning teachers (Campbell, 2009; Hew & Cheung, 2010). This interest continues to grow since a recent study has reported the importance of iterative design and evaluation when implementing *Second Life*™ virtual worlds for learning in the HE setting (Mayrath, Traphagan, Heikes, & Trivedi, 2011), whilst another study has investigated problem-based learning as a pedagogy in a virtual immersive world designed to support learning in a health care setting (Beaumont, Savin-Baden, Conradi, & Poulton, 2012).

Learning theory

The present study is guided and underpinned by the socio-cultural learning theory of Vygotsky (1978) who emphasised the important role of dialogue and argued that learning is not 'rote' but is a process of enculturation whereby new learners become integrated into a

knowledge community (Vygotsky, 1978; Wenger, 1998). This theory aligns closely with social constructivism as encompassed within Wenger's Community of Practice learning theory (Lave, 1988; Lave & Wenger, 1991; Wenger, 1998). Social constructivism also recognises the crucial role of learners' peers as they work together to negotiate meaning that is situated or anchored in authentic learning activities that are directly relevant to the learner's life (Brown, Collins, & Duguid, 1989; Dede, 2009; Lally & De Laat, 2002, 2003).

The overarching conceptual framework used to guide this empirical research study draws on the Community of Practice model and social constructivism (Wenger, 1998). More recently, Woo and Reeves (2007) have summarised the main features of learning based on the social construction of knowledge which leads to meaningful learning in a web-based setting. Briefly, learning is an organic process of participation in activities to re-negotiate meaning with a group of others in an experiential fashion over time. This model of learning also provides a mid-level analytical framework for 'measuring' when a Community of Practice has evolved (Wenger, 1998, pp. 125–127). Thus, a learning community evolves organically by a group of learners participating and working together (*Mutual Engagement*) on activities (practice) and through their collaborative endeavours (*Joint Enterprise*) they develop shared competencies or skills (*Shared Repertoires*) over a period of time (Wenger, 1998, p. 73).

Community of Practice also emphasises the fluidity of roles in which peers and mentors become interchangeable depending on the activity and where the expertise lies (Wenger, 1998, p. 296, note 11; Guldberg, 2010). It allows for the integration of peripheral participants by knowledge sharing and it can be further strengthened by the sharing of 'boundary' communities (Wenger, 1998). The development of the present learning community was framed within the main overarching themes of 'Mutual Engagement' through 'Joint Enterprise' to 'Shared Repertoires' since this aligned very closely with the formation, development and evolution of the Inter-Life learning community. This model was used to guide the data collection and analysis and also to provide a framework to enable us to answer the Inter-Life research questions (p. 2).

Context

Since the aim of this study was to investigate the efficacy of Inter-Life as a tool to support the development of life skills in adolescents who were in Local Authority Care, we developed a strong partnership with colleagues in Social Services and Children's Services, including social workers, educational psychologists, Information and Communication Technology (ICT) personnel and 'Corporate Parenting' boards. The Inter-Life launch event, along with the partnership work entailed will be detailed in a future article. One of the main features which facilitated engagement of these key stakeholders with the Inter-Life project was the research team's dedicated commitment to the safety and security of the young people involved. The Inter-Life research team developed a 'recording grid' which automatically records the avatar three-dimensional positional data co-ordinates and associated 'in-world' text communications in a time-stamped manner, which is stored securely at a central project server (Magill et al., 2009). Although the young people were responsible for devising their own rules and regulations for appropriate behaviour in Inter-Life, the researchers made it clear from the outset that the 'in-word' (i.e. within Inter-Life) text chat-logs are automatically archived, not only for data analysis that gives insight to learning processes in Inter-Life, but also for security reasons.

Inter-Life island 2 (IL-I2) is based on the *Second Life*™ grid but it is a locked, private island, isolated from the rest of the grid, so that no one can teleport to or from IL-I2, which

was essential in order to provide a secure environment for the young people. Only young people between the ages of 13 and 17 years of age were allowed access to IL-I2 and any adults involved all held enhanced Disclosure Scotland or CRB checks. Full and extensive ethical approval was obtained from the University of Glasgow, Faculty of Education Ethics Committee, as well as from the partner Local Authorities. The Inter-Life research team developed a tailored Registration Applications Programme Interface (Reg API) web registration system which securely logged new account details as they were created for participants by the researchers (Magill et al., 2009). Therefore, it is worth emphasising that IL-I2 is not public or accessible by anyone who has not been registered by the researchers. It was built, along with a customised Reg API to be a secure, safe and private virtual world for a group of adolescents to work together creatively on life transition skills development.

Inter-Life workshops

A series of 12 (n = 12) Inter-Life workshops was run, on a weekly basis (5–7 pm) between March and June 2010. The workshops (2 h long) enabled the young people to participate in a mixture of open-ended and structured activities that would help to support transition skills learning through the social, cognitive and affective domains. Table 1 provides a sample of the Inter-Life workshops, including the learning activities and how they map to the learning outcomes in the form of life skills development. The first five workshops were held in a venue that was provided by the partner local authority and was easily accessible by the young people (and their foster parents/carers) after school. We recruited a group of seven young people initially (n = 4 boys; n = 3 girls) from a larger number who came along to the initial workshops. However, due to several unpredictable issues in the lives of the young people, the longer term membership of the core group stabilised at six members (n = 4 girls and n = 2 boys). The young people and researchers worked together in Inter-Life to differing extents throughout the workshops, and importantly two or three of the researchers participated 'in-world' remotely (i.e. at other locations) via their avatars due to the multi-site distribution of the research team. This enabled the young people to experience working with some members as avatars in an online, 'in-world' setting only. Whilst the first five workshops were held locally, the subsequent seven workshops were held in a laboratory with a suite of networked PCs in the Faculty of Education at the University of Glasgow, which enabled each participant to have access to a PC with reliable Internet connectivity to support the Inter-Life virtual world.

The Inter-Life workshops used a blended pedagogy which involved some face-to-face work, followed by work on activities 'in-world' in the Inter-Life virtual world. A blended learning approach with this group of young people along with the support of their foster parents/carers was essential for initial socialisation and for building mutual trust and respect between participants in order to form supportive relationships that contributed to an ethos of care, respect and learning (Goldstein, 1999; Preece, 2004). However, from the outset, a strong theme within the present work was to empower the young people to take ownership for the collaborative work and the development of skills and resources on IL-I2. For that reason, the researchers' aim was to facilitate and support the young people in their learning rather than direct it. The researchers have extensive experience of facilitating learning in online settings (De Laat & Lally, 2004) and were sensitive to the context and ethos of Inter-Life.

Data collection and analysis

Data collection was mainly qualitative in keeping with the social constructivist approach which favours 'multi-voicedness' and 'rich descriptions' from learners of

Table 1. Representative sample of Inter-Life workshops to illustrate the progression of the workshops and the parallel development of the learning community with concomitant transition skills learning that was operationalised through participation in the Inter-Life workshops.

Workshop theme	Stage of development	Processes involved	Transition skills learning
Workshop 2. Development of rules and norms. Avatar personalisation. Unexpected terra-forming incident	*Early stage* in community development. Establishing norms and rules, exploration and personalising engagement	Digital navigation and communication skills. Devising participant rules, manners and norms when working and interacting with others in Inter-Life. Experiencing unexpected terra-forming incident in Inter-Life	Interacting with peers respectfully. Participating as part of a group. Communicating clearly. Articulating feelings and 'speaking up'. Peer-to-peer support (e.g. in Avatar customisation). Exploration of a new environment
Workshop 8. 'All about me' presentation on real-life interests and hobbies prepared and presented in Inter-Life	*Middle stage* of community formation. Working collaboratively on a creative arts-based activity	Working with others as part of a team to gather real world photographic images using Mobile phones. Creatively structuring a *personally meaningful* narrative. Design, preparation and uploading images via 'Twit-Pic' into Inter-Life. Presentation about self to peers in Inter-Life. Receiving comment and feedback from peers	Self-confidence, teamwork skills, collaboration skills, supporting peers, development of personally meaningful artefacts for group reflection. Contributing to a group. Creation of a model or representation that will become part of the Inter-Life island for revisiting
Workshop 10. Managing a change or a loss experience sharing workshop	*Learning community formed* through shared history of participation in activities. Strong ethos of respect and trust formed	Intensive in terms of exploring vulnerability at points of transition/change in life. Intensive since issues were raised and articulated by young people themselves	Empathy, 'walking in someone else's shoes'. Respect for others. Understanding how to reflect on *a real-life problem* with cognitive and emotional content about risk and change and develop a solution that is *personally meaningful.* Exploring issues of risk, change and uncertainty through collaborative supportive discussions Understanding the perspective of others. Learning from sharing with others life stories/experiences
Workshop 12. Countries and fashion show activity	*Mature stage*. Learning community established and now self-regulating	Coordination of project by young people. Communication, collaboration, recording, suggesting and designing activities. Project management, task assignment	Interpersonal and organisational skills. Negotiation skills. Decision-making and reaching consensus. Leadership and teamwork skills. Planning group processes

their experiences (Lincoln & Guba, 1985). IL-I2 has an integrated recording grid that automatically logs avatar positional data and the text chat between avatars 'in-world' in a time-stamped manner. These chat-logs capture rich evidence of the participants' dialogue surrounding the learning activities and the complete 'in-world' chat-logs of all 12 Inter-Life workshops were available for analysis. In order to gather 'baseline' information on the young people's prior access to, and experience with, technology as well as their general interests, we conducted a Focus Group and distributed a short baseline questionnaire. The short questionnaire (with open questions) was introduced reflexively (Marshall & Rossman, 1999; Creswell, 2009), since some of the young people had a preference for preparing written replies rather than speaking in a Focus Group and this is in keeping with the ethos of the project. Workshop observations were conducted to monitor group dynamics and to assess which features of face-to-face and 'in-world' activities contributed to engagement and development of the learning community. In addition, reflective semi-structured research interviews were conducted with a self-selected sub-group of young people and their foster parent/carer towards the end of the series of workshops. A follow up questionnaire was also distributed, in order to include the feedback and views of all the young people, including those who were not available to participate in a research interview. The complete data sets drawn on for this study are summarised in Table 2. Such multiple and rich data sets, along with more than one methodology, enables triangulation which was employed to strengthen the robustness of the present research study (Erickson, 1986).

The Inter-Life workshop chat-logs, focus group transcript, workshop observations, questionnaire data and semi-structured research interview transcripts were uploaded into NVivo 8 and analysed in an inductive, iterative fashion, using a social constructivist analytical lens in order to answer the research questions about transition skills learning through the affective, social and cognitive domains. This was an iterative process which involved initial open coding then analytical scrutiny of each piece of data to construct and define units of meaning. The analytical coding framework and units of meaning were verified by continual comparing and contrasting naturalistic excerpts of meaning across data sets. The coding structure, the codes and their units of meaning were verified by a second researcher to ensure accuracy of coding. A comprehensive analysis was conducted, against the coding framework, across the whole data set in order to ensure the results of the analysis were strongly reflecting the evidence gathered from as many participants and by using as many meaningful methods as possible (Erickson, 1986; Patton, 2002). The methodology used a coding structure that was guided by the research questions as well as being sensitive to any emergent themes (Miles & Huberman, 1994).

Table 2. Data sets used for analysis.

Data sets	Number
1. Baseline focus group	$n = 4$ (2 girls and 2 boys)
2. Baseline questionnaire	$n = 7$ returns (4 girls and 3 boys)
3. Collated time-stamped text chat-logs from workshops	$n = 12$ workshops (with 5–7 young people in each workshop)
4. Workshop observations	$n = 12$ workshops observation memos
5. Follow up questionnaire	$n = 5$ returns (4 girls and 1 boy)
6. In depth semi-structured research interviews	$n = 3$ (with 3 sets of young people and their foster parent or carer)

In order to articulate the results from this study, the results were synthesised and presented in order to answer the Inter-Life research questions and report any emergent findings, in relation to the main overarching themes as defined in Wenger's (1998) *Community of Practice* since learning in Inter-Life was in close alignment to this rigorous social constructivist theory and involved the evolution of a learning community with concomitant building of knowledge and skills through participation. All personal identifiers have been removed to maintain anonymity of the participants. Where names have been used either in the body of the paper or in any figure these are all pseudonyms. In addition, pseudonyms have been used for all of the avatars in the present study (Minocha et al., 2010).

Results

Mutual engagement and novel affordances of Inter-Life

Data analysis showed that the novel affordances of the Inter-Life virtual world appealed to the young people, captured their interest and led to motivation and engagement. These results relate to the initial workshops (Table 1) in the early stages of formation of the learning community and highlight the new media affordances of Inter-Life which led to mutual engagement. These new affordances included the ability to personalise and name their own avatar along with a sense of social presence with peers and a strong feeling of immersion in Inter-Life which had an impact on *the affective domain* resulting in motivation, engagement and initial bonding in the group. This positive emotional response was immediately obvious, since there was an air of excitement and anticipation observed as young people were being registered and this was openly expressed when they actively began investigating the Inter-Life virtual world. For example, the excitement of meeting one of the researchers who was participating remotely 'in-world' is captured in the language of the following chat-log discourse:

> Hey, Grounder, can I add you as a friend to this funky thing?!
> Starlight Sun (Young person's avatar)
> [Inter-Life Chat-log, Workshop 2]

Similarly, in a research interview, when a young person was asked what they liked about Inter-Life, they replied:

> When I am not here, I am bored!
> (Young person, Research Interview 1)

In the initial learning activities that involved avatar personalisation and virtual 'sky-box' design in Inter-Life, a young person commented whilst working on the Inter-Life virtual apartment or 'sky-box':

> This is beginning to get really fun!
> Zhandra Green (Young person's avatar)
> [Inter-Life Chat-log, Workshop 4]

This evidence, along with the questionnaire responses, which showed that the emotions the young people most frequently felt when starting to work on Inter-Life were 'happy', 'enthusiastic' and 'confident' supports a positive impact on the affective domain.

In addition to the strong emotional response, the young people very quickly began to personalise their avatar and identified with it as 'self'. For example, in one of the early workshops (Inter-Life Workshop 3) an episode of informal chat between two young people's avatars 'in-world' about their avatar's height was captured where one young person refers to their avatar as 'me':

> You are a bit small Aster, compared to the rest …. Zhandra Green

To which Aster replies:

> Stop teasing me! … Aster Angel
> [Inter-Life Chat-log, Workshop 3]

However, there were also a few incidences of frustration observed due to the 'lag' of the graphics rendering of the virtual world, but the graphics improved when the group transferred up to the university-networked suite of PCs.

The new three-dimensional virtual world rendered in time and embodiment in the form of a personalised avatar, and the ability to walk, sit and fly in the virtual world, along with the ability to communicate and interact with peers resulted in a strong sense of 'immersion' or 'co-presence'. This sense of immersion as an avatar in Inter-Life was highlighted in response to an unexpected, serendipitous event that happened in Workshop two, when one of the boys spontaneously modified the IL-I2 virtual island terrain and created a new mountain range which caused confusion to the group who were working 'in-world'. The sense of immersion in the virtual world was very strong, as is shown in the following chat-log entry during this unexpected event, in which one young person's avatar reacts in the virtual world as if it were happening in the real world:

> Somebody help me! I can't find where the heck I am! Its Graham, he has mucked everything up.. I think I am in the middle of the mountains, please help me out!!
> Starlight Sun (Young person's avatar)
> [Inter-Life Chat-log, Workshop 2]

The initial Inter-Life workshops consisted of a mixture of structured activities, such as participating in a discussion about a creative film about the potential of Inter-Life (Figure 1) or more open-ended activities such as chatting about plans for the Easter holidays.

Peripheral participants and development of mentoring skills

However, after the stage of initial socialisation, engagement and as the workshops progressed in time, and through participating in the activities, the skills and knowledge of the learning community increased. As new members were being recruited, the young people tried to support such peripheral participants (Lave & Wenger, 1991) and encouraged them to become part of the learning community. One young person reflected on trying to help a new member through peer mentoring:

> You know how we had all started off and everybody was doing their own thing, but then John … and that were brought in at the point when we were at the university and everybody was ahead and they were doing their own thing, whereas John was … I was trying to help him, but he was getting frustrated because … you are all ahead, how am I supposed to build my house …?
> (Young person, Research Interview 3)

Figure 1. Screenshot of young people's avatars participating in an 'in-world' (i.e. in Inter-Life) discussion about a film that had been shown in one of the early Inter-Life workshops. Avatar names are pseudonyms (Minocha et al., 2010).

This peer mentoring and support between the young people was also observed in the workshops when new members joined the group and enabled young people to demonstrate what they had learned.

Fluid leadership and development of a community

As the learning community developed, there was evidence of fluid or distributed leadership, with 'novices', 'apprentices' and 'experts' working together in a fluid, interchangeable capacity in order to effectively address the current task. The young people were frequently in the role of teacher/facilitator as they helped the researchers to navigate the three-dimensional world. For example, one of the young people helped a researcher to control the 'zoom' function on their avatar's camera, whilst another young person helped a researcher to modify their avatar's appearance, as is illustrated in this chat-log discussion between a young person's avatar (Zhandra Green) and a researcher's avatar (Hilltop Rose):

> Will someone tell me how to change my outfit, I want one like Starlight ….?
> Hilltop Rose (Researcher)
> Click the right key and click appearance then you can change your clothes …
> Zhandra Green (Young person)
> Yes, thanks …. just can't seem to ditch the skirt!
> Hilltop Rose (Researcher)
> I know …. I know, it's hard …
> Zhandra Green (Young person)
> [Inter-Life Chat-log, Workshop 6]

However, there were a few instances in which the young people asked the researchers about additional features they would like 'in-world'. In particular, the boys were interested in the availability of more interactive 'action' type tools that may have resulted from previous gaming experience, which is consistent with findings from the initial focus group. For example, 'Ron Greyhawk' persisted in a long negotiation with one of the technical researchers around his request for a swimming pool and a diving board to be built 'in-world':

> Hi Bright Blackbird, would you tell me if you have a diving board so that I can dive off it? … Yes, a springy one thanks
> Ron Greyhawk (Young person's avatar) to Bright Blackbird (Researcher's avatar)
> [Inter-Life Chat-log, Workshop 6]

Joint enterprise, collaborative learning

Participating in joint activities (joint enterprise) meant that transition skills development was also operationalised through some of the more structured learning activities, such as an inclusive, creative arts-based activity, in which the young people collected photographs (from the real world) for a presentation about their lives and their interests 'All about me' which they presented to their peers in the Inter-Life virtual world (Table 1). This involved collaboration in collecting photographs using Inter-Life mobile phones and uploading their favourite images onto their presentation boards 'in-world' on IL-I2 (Figure 2(a) and (b)). This formed the basis of a discussion and critique by their peer group in Inter-Life which is, of course, a central tenet of the social constructivist learning approach. Figure 2(a) and (b) are screenshots from the Inter-Life virtual world that show representative examples of the young people's presentations as part of the 'All about me' activity.

During the workshops on the photo journals and presentations in Inter-Life, the voice of one 'young person as avatar' replied when asked about their thoughts on this activity:

> The activity made me realise we can work together in a group and that is what Inter-Life is all about …
> Aster Angel (Young person's avatar)
> [Inter-Life Chat-log, Workshop 7]

A young person reflected on the benefit of being involved in this type of creative and personally meaningful activity:

> I just think Inter-Life, when we did the PowerPoint and it was all about what *you* wanted to write in this PowerPoint whereas in school you can't do PowerPoints about things you want to write about.

Upon reflection and comparing this to school:

> … So [in school] …. we are doing a PowerPoint on an aeroplane and a train and a car and a bus ……. It's pretty boring but!
> (Young person, Research Interview 3)

Thus, the combination of the educational design of the activities and the novel social affordances of Inter-Life leveraged the agency of the young people to use their creative thought processes and develop critical thinking skills.

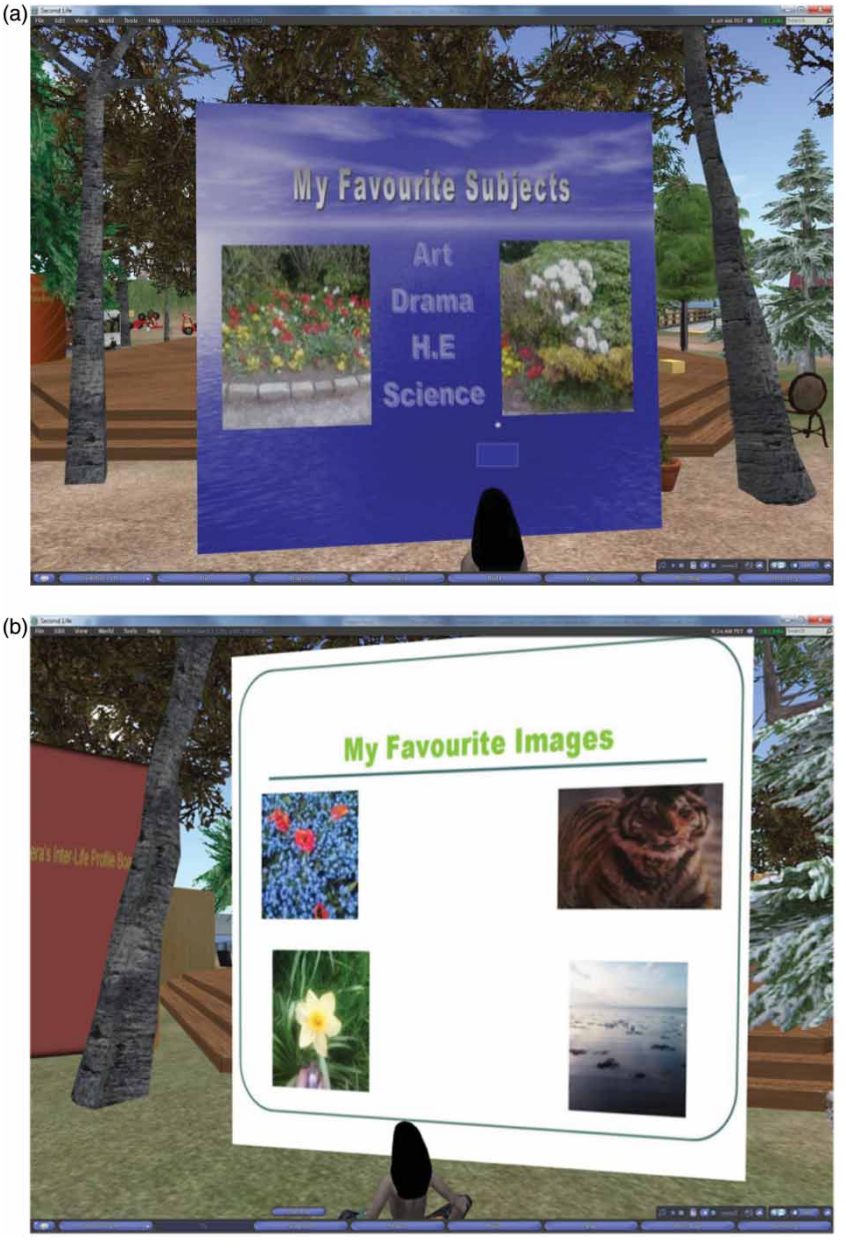

Figure 2. Screenshots of representative examples of personalised displays created in Inter-life by young people as part of the 'All about me' activity. (a) 'My favourite subjects' and (b) 'My favourite images'.

Shared repertoires, shared competencies; life transition skills

The Inter-Life learning community progressed to addressing deeper, authentic vulnerability issues at points of transition, which were raised and initiated by the young people based on, or related to, their own real-life experiences. For example, during the workshop on 'Loss' the young people worked face-to-face to consider ideas

and experiences, and this was followed up by convening a supportive reflective discussion in Inter-Life. One young person raised the issue of moving schools and losing friends, based on personal experience. This involved the young person leading the discussion on their own experience then re-shaping an understanding of how to re-interpret loss into something positive and share this knowledge and insight with other young people in the group who may encounter similar experiences. At this more advanced stage of the learning community and in order to support this collaborative reflective discussion, a peer moderated the discussion:

> Well what I have got to say about with one of my losses which is actually quite positive is that I have moved school to have a fresh start in life, the only thing that I lost because of my move to a different school is that I have lost a lot of good friends through this move. But I will always keep in touch with them. I would say that not all losses are negative, some of them are very positive.
>
> Aster Angel (Young person's avatar)
>
> Can everyone be quiet please? Aster is trying to speak, will you all listen please?
>
> Starlight Sun (Young person's avatar)
>
> [Inter-Life Chat-log, Workshop 10]

Therefore, the young people showed a strong sense of empathy and such meaningful contributions illustrate the development of strong relationships of trust and respect as well as evidence of critical thinking skills.

Community of Practice/self-regulating community of learners

As the Inter-Life learning community matured, it began to self-regulate and the young people began to lead and start active problem-solving in their community. This was evidenced when instances of tension or frustration led the group to intervene if a group member was being too dominant or on another occasion the synchronous nature of the text chat was causing some tension, with participants 'talking' too quickly and disrupting the flow of discussion. The young people collaborated to devise rules for turn-taking and making a meaningful contribution to 'in-world' discussions in order to emphasise the ethos of their group. They summarised this outcome on a PowerPoint slide for displaying in Inter-Life (Figure 3).

As a result of working collaboratively on various meaningful learning activities, the community matured and the young people began to undertake more planning and regulation of events. One of the foster parents/carers commented:

> It turned into a small family network really, didn't it?
>
> (Foster parent/carer, Research Interview 3)

The issue of Inter-Life *turning into a network over time* aligns with the development of a Community of Practice which was strengthened by participants sharing the same 'boundary' community (Lave & Wenger, 1991) of being looked after or accommodated. Towards the end of the workshops one of the young people reflected about the change in their learning over time and the development of confidence:

> I wasn't as confident I don't think until I came to Inter-Life … I think I was dead (really) not pure shy, but sometimes I come across as confident and all this, but really I am not..[….] and I have learned how to make friends …
>
> (Young person, Research Interview 3)

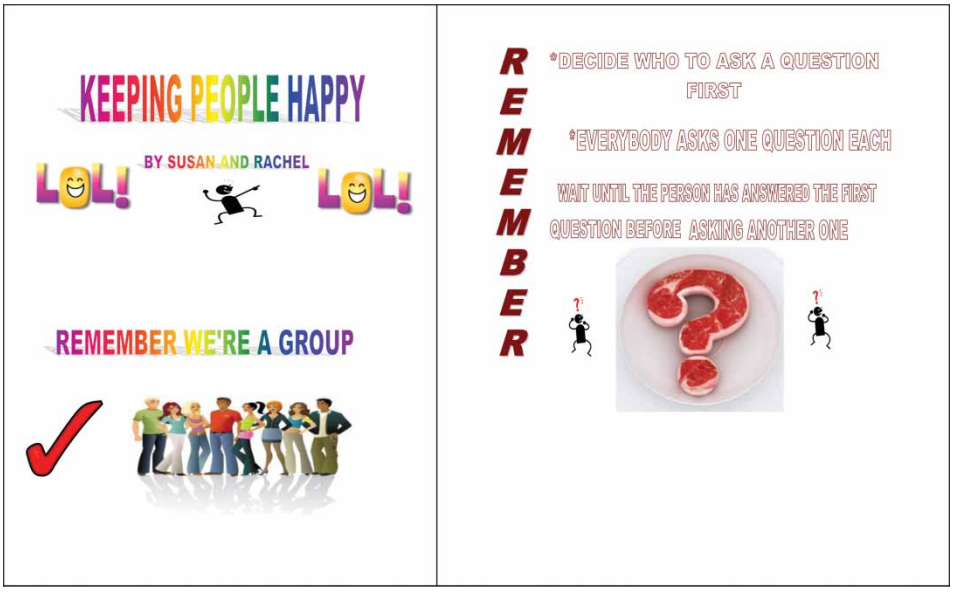

Figure 3. Inter-Life rules and regulations composed by the young people through collaboration to illustrate part of an active problem-solving activity (Names on slide are pseudonyms).

Furthermore, this young person recognised changes in peer learning over time, which also relates to the formation of a learning community or Community of Practice (Wenger, 1998). Other evidence from the questionnaire returns indicated that the young people had learned how to work together, support others and make friends as a result of participating in Inter-Life.

Towards the end of this series of workshops, the young people were devising lists of activities for forthcoming events as well as adopting leadership roles. One of the young people began to lead the coordination of a workshop (that the group had chosen) about countries of the world and different cultures, thereby demonstrating leadership and moderation skills:

> Can everyone please come to me and tell me which country they would like to do, for example, Mexico?
> Starlight Sun (Young person's avatar)
> [Inter-Life Chat-log, Workshop 12]

Furthermore, in two of the research interviews carried out, the young people commented on how they would like to recruit new participants and recommended others in their peer group whom they thought would benefit from joining the Inter-Life learning community:

> I was going to ask if my wee (younger) brother can come to Inter-Life and you would need to give […]..the thing about where it is and that ……
> (Young person, Research Interview 2)

Conclusions and discussion

The innovative Inter-Life interdisciplinary research study aimed to investigate whether an augmented three-dimensional virtual world would be a suitable technology-enhanced tool to support the learning and development of life transition skills in young people (Devlin,

Lally, Sclater, & Parussel, 2011). It is strongly located within the ongoing debate on the need for technology that supports deep and meaningful learning by being flexible and shaped by the learners (Dede, 2009; Selwyn, 2010). This is why the Inter-Life virtual world was designed loosely from the outset, but with a strong knowledge of pedagogy and learning activities that would support social and active learning (Wenger, 1998). Inter-Life was designed to be sustainable and build capacity by creating a re-usable, flexible space with an educational structure that provides support for a variety of authentic learning activities, allowing for both extensive learner input with concomitant, increasing growth of learner autonomy (Brown et al., 1989).

Importantly, the young people participated in a combination of open-ended and structured social and educational activities (Table 1) in the novel context of Inter-Life in order to enable us to understand the significance of this new space and the processes involved in learning, as well as the learning outcomes. The findings from the present study provide some new evidence to suggest that Inter-Life is a suitable learning environment to facilitate deep and meaningful learning of life transition skills such as self-confidence, negotiation and mediation skills, empathy, teamwork and active problem-solving skills, since the young people appropriated the novel affordances of Inter-Life in order to work on authentic, situated activities which have implications for transition skills development in the real world.

One of the key findings from the present study was how the opportunity to personalise learner involvement from the very start through designing and naming the avatar led to a positive impact on the affective domain and on learner engagement. There was much happiness and enthusiasm as the young people worked on the initial task of avatar personalisation, and began to interact and communicate with each other via their avatars 'in-world'. This is in contrast to a previous study by De Freitas et al. (2010) in which some older learners struggled to work on their avatar or relate to a virtual world. This novel affordance along with the experience of 'co-presence' and 'immersion' contributed to initial socialisation, interaction and motivation to participate. The role of extrinsic and intrinsic motivation and how it impacts on learner engagement has been well documented (Ryan & Deci, 2000). Therefore, it is possible to suggest, based on the empirical evidence gathered in the present study, that these novel affordances (personalisation, co-presence and immersion) of the Inter-Life virtual world had an impact on the young people's intrinsic motivation leading to interaction with peers and engagement in learning in Inter-Life.

The three-dimensional Inter-Life platform enabled distributed or fluid leadership, in an environment in which the young people not only worked together but also helped to support the facilitators/researchers. The skills and enjoyment increased as the learners worked with Inter-Life over time. The project-based nature of Inter-Life *enabled the processes involved in participation to be mapped to learning outcomes* in the form of life transition skills required for a complex, contemporary society. As the community coalesced in an organic manner, the life skills were operationalised through meaningful collaboration and personalised activities, such as 'stories about self/ all about me' which produced rich socio-cultural artefacts (or persistent 'transition tools') which made Inter-Life a personally meaningful environment for these young learners. The creation of personalised 'learner-generated content' and resources in Inter-Life helped to build ownership in the young people and contributed to the development of a self-regulating learning community.

However, some of the limitations of this study must be addressed. First, this study involved a specific group of learners of mixed ability and who were in local authority care and this represented a number of significant challenges to be overcome (Heptinstall, 2000). The first and most obvious one was the concern for the safety and well-being of

the young people who wished to participate. A considerable amount of time was invested in careful negotiations and discussions with partner stakeholders, as well as a strong investment to ensure the safety and security of IL-I2 so that the project would be conducted in an ethical and sensitive manner (Goldstein, 1999). Second, due to the group of learners and the commitment required to participate in the 12 Inter-Life workshops, the number of young people was understandably small. This was recognised from the outset, since the development of this learning community was intense and entailed the building of strong bonds of mutual trust and respect (Goldstein, 1999; Preece, 2004). Initially, we tried to recruit an equal number of boys and girls, but after the first few workshops and for various reasons, not least the complexity of their lives, two of the boys dropped out, whilst another girl joined the group. It was clear both from observations of the initial workshops and the focus group that some of the boys had extensive gaming experience and were used to faster graphics rendering and pre-defined competitive gaming scripts which may have contributed to their attrition. This is in keeping with previous studies that show that a history of gaming does not confer any advantage in terms of the skills needed; both functional and social for effective learning in three-dimensional virtual worlds (De Freitas et al., 2010). However, it is possible that some competitive-structured activities may be required to be in place '*in situ*' in order to capture the boys' attention more rapidly in future studies. But this finding must also be held in the context of the great complexity of the young people's lives and the 'slipperiness' of this group of learners (Heptinstall, 2000).

In the present study, we used a blended pedagogy for pragmatic and safety reasons. This approach was found to contribute to the early stages of formation and development of the Inter-Life learning community. Previous studies have referred to a 'hybrid space' (Oliver & Carr, 2009) that consists of preparation and ideas that are supported in a face-to-face setting followed by creative learning and development 'in-world' in the virtual environment. Although the blended pedagogy was important for this group of learners in this setting, the next iteration of Inter-Life will be to move to a set of solely online 'in-world' workshops.

It is worth highlighting that although this group of young people were in care, life transition skills are important for all young people and as such, novel virtual worlds may facilitate learning as part of the more formal mainstream setting (Facer & Sandford, 2010; Robertson, 2005). Bonamy, Charlier, and Saunders (2001) recommended the need for young people to experience the 'post-transition' world along with the ability to actively shape alternative futures or outcomes, and Inter-Life has provided evidence to illustrate the potency of new learning spaces and paradigms. It is interesting to note that most of the current studies of virtual worlds and learning are being conducted in the HE setting or with beginning teachers (Bronack et al., 2006; Hew & Cheung, 2010). This may be indicative of a wider paradigmatic shift in models of learning that young people will experience in the future (Facer & Sandford, 2010; Searson, Jones, & Wold, 2011). Indeed, the River City project is a recent innovative study (based on the *Active Worlds* platform) which has shown some positive impact on science inquiry skills in middle school/K 12 students in mainstream settings (Ketelhut, Nelson, Clarke, & Dede, 2010). As such, it may be timely that Inter-Life is one of the first interdisciplinary projects that is investigating enhanced immersive virtual worlds as a novel setting for young people to work collaboratively on transition skills learning.

The present study provides new evidence for the important role of innovative, engaging technology in setting the scene for a new learning space or ecology which can be tailored and which appeals to adolescents and their digital culture, but with an underpinning critical educational design (Wenger, 1998). This illustrates the importance of pedagogy to support

the critical use of technologies for learning that is in context (Kennedy et al., 2010; Selwyn, 2010). This crucial awareness and understanding of how deep learning occurs, namely through a 'loose' educational design, was essential in order to allow a space for learning to occur and for the learners to become autonomous. As Wenger (1998) has already commented:

> Learning cannot be designed and yet there are few more urgent tasks than to design social infrastructures that foster learning ……..
>
> Those who can understand the informal yet structured, experiential yet social character of learning – and can translate their insight into designs in the service of learning – will be the architects of our tomorrow.
>
> Wenger on 'Design for Learning'. (Wenger, 1998, p. 225)

This careful blend of pedagogy in relation to innovative technologies may perhaps remain counter-intuitive to those involved in the technical design of technologies for learning. However, some of the creative displays that the young people produced as 'learner-generated content' for presentation 'in-world' in Inter-Life resonated very strongly with adolescent culture (Figures 2 and 3). Since these artefacts were representations of the young people's own thoughts and developing skills, they could not have been pre-designed. Similarly, the life experiences, as articulated by the young people in the supportive setting, were meaningful because they were *raised by and shared amongst* the young people. As such, the present study provides new empirical evidence to support the importance and potency of all learners being given the opportunity to help shape new technologies for learning. Inter-Life was organic, fluid and creative, yet structured with the aim of developing a new tool to support meaningful learning. Undoubtedly, the interdisciplinary nature of the Inter-Life research team also contributed to this. It is also worth highlighting that the 'learner-generated content' and artefacts in Inter-Life are 'persistent', meaning they are available continually since they are located in a virtual world. This means that resources can be revisited, reviewed or updated in the Inter-Life virtual world at any time making it a flexible, as well as personalised and sustainable, TEL tool.

Findings from the present study provide some new empirical evidence to suggest that the Inter-Life virtual world is effective in supporting the learning and development of life transition skills. The present study seeks to move the field forward by demonstrating what is possible when young people, who are often 'protected' from a resource, are allowed to experience technologies that can richly contribute to their learning in a transformative fashion by engaging in a critical manner, which again may have wider implications for all young people. For this group of young people, in particular, it was a rare opportunity to learn as a part of a group in an inclusive participatory manner and the findings may have implications for virtual worlds and learning in mainstream settings. However, this is still a relatively new and emerging field and will require much more investigation.

In conclusion, the present study provides some new evidence to show that the Inter-Life virtual immersive world can contribute, in an innovative and creative way, to life transition skills learning for young people with the aim of equipping them with lifelong skills for positive life chances, which ultimately is the aim of all new technologies for meaningful learning.

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